A clinico-epidemiological study of fatal head injuries in an autopsy centre of Kolkata (West Bengal)

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Abstract: Incidence of head injury is increasing over years, and is one of the leading causes of mortality and morbidity in developing countries. Epidemiological data from different regions are required for planning appropriate preventive measures. Present study, a cross-sectional descriptive study, tried to reflect the epidemiological characteristics and temporal trends of fatal head injuries in Kolkata between 2013 and 2014. Subjects of age group 41-60 years were affected most (46%), with an overall majority of males (74%). Road Traffic Accidents comprised more than half of the total fatalities (56%), with an overwhelming 29% of the subjects adding to pre-hospital morbidity. Fracture of the vault of the skull (72.72%) and fracture of anterior cranial fossa (44.45%) of the base of the skull were the most common fractures. Parietal bone was involved mostly (45.45%), with subdural hemorrhage being the most common intracranial hemorrhage (58%). 29% of the victims died on the spot, while 17% died within 24 hrs of the accident. 39% of the subjects survived for 4-7 days & 15% survived for 8-14 days.

Keywords: Intracranial hemorrhage, Kolkata, Fatal head injury (FHI), Skull fracture

I. Introduction

Head, the relatively small portion at the cranial part of human body, has been always considered as a prime part in several aspects. The injury to head, naturally, has been again considered with serious thoughts (1). Numerous research works and studies have been done till date only to realize the pathology related to or the cause and circumstances resulting it and to find a way to get rid of either head injury or its consequences. Head injury is defined by National Advisory Neurological Disease and Stroke Council as “it is a morbid state resulting from gross and subtle structural changes in the scalp, skull, and/or the contents of the skull produced by mechanical forces”.

Incidence of head injuries/ traumatic brain injuries (TBI) is increasing day by day, and this is the major cause of morbidity and mortality in developing countries (2). Some studies from India had described the incidence of traumatic brain injury, but there is lack of data from eastern part of India. Epidemiological data from different regions are required to start appropriate preventive measures and for planning the necessary services. However, reliable statistics are difficult to extract from routinely collected data. This study was planned with the objective to describe the epidemiological characteristics and temporal trends of fatal head injuries in Kolkata between 2013 and 2014, with regards to age, sex, manner of causation, anatomical sites involved and patterns of injury.

II. Materials And Methods

The present study is a cross-sectional descriptive study, which was undertaken in the Department of Forensic Medicine and Toxicology of Nil Ratan Sircar Medical College & Hospital, Kolkata, West Bengal between 2013 and 2014. The study includes total 100 medico-legal post mortem cases of fatal head injuries (FHI) where injury to other parts of body are not of much significance. SPSS version 22 for windows and Microsoft Excel for Windows 8 were used for analysis of results.

II.1. Inclusion criteria
First 100 cases of fatal head injuries reported at the Police Mortuary of Nil Ratan Sircar Medical College between 2013 and 2014.
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II.2. Exclusion criteria
a. Patients with gross abnormalities of cranial cavities.
b. Patients known to be suffering from some cerebral poisoning.
c. Patients with blood dyscrasias.
d. Decomposed bodies.
e. Unidentified or unknown dead bodies.

III. Results
The present cross-sectional descriptive study was conducted with 100 cases of fatal head injuries.

III.1. Distribution according to age
Subjects of age group 41-60 years were affected most (46%), followed by 21-40 years (32%), 1-20 years (14%), 61-80 years (6%) and 81-100 years (2%).

III.2. Distribution according to gender
Of the total subjects studied, 74% were males and the rest 26% were females.

III.3. Manner of causation of injuries

<table>
<thead>
<tr>
<th>Causative factors</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road Traffic Accident (RTA)</td>
<td>56</td>
</tr>
<tr>
<td>Fall from staircase</td>
<td>13</td>
</tr>
<tr>
<td>Assaults and violent acts</td>
<td>10</td>
</tr>
<tr>
<td>Fall from height</td>
<td>4</td>
</tr>
<tr>
<td>Fall of tree on head</td>
<td>2</td>
</tr>
<tr>
<td>Train/railway accident</td>
<td>6</td>
</tr>
<tr>
<td>Factory/industrial accident</td>
<td>5</td>
</tr>
<tr>
<td>Dashed by animal</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

III.4. Rate of hospital admission
Pre-hospital morbidity was found to be in 29 cases (29%). The rest 71 patients (71%) were taken to hospital.

III.5. Period of survival
A large proportion of the victims (n=29, 29%) died on the spot while 17% (n=17) died within 24 hrs of the accident. Thirty nine cases (39 %) survived for 4-7 days & 15 cases (15%) survived for 8-14 days.

III.6. Sites of skull fracture

<table>
<thead>
<tr>
<th>Sites of fracture of skull</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vault of skull</td>
<td>34</td>
<td>65.39</td>
</tr>
<tr>
<td>Base of skull</td>
<td>8</td>
<td>15.38</td>
</tr>
<tr>
<td>Vault + Base of skull</td>
<td>10</td>
<td>19.23</td>
</tr>
<tr>
<td>Total</td>
<td>52</td>
<td>100</td>
</tr>
</tbody>
</table>

III.7. Types of skull fracture

Figure 1 Distribution according to types of skull fracture
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III.8. Distribution according to location of basilar fracture
Fracture of anterior cranial fossa was observed in 8 (44.45%) cases, followed by 6 (33.33%) in middle cranial fossa. The lowest number of fractures was seen in posterior cranial fossa and combined middle and posterior cranial fossa with 2 (11.11%) cases in each.

III.9. Bones involved in skull fracture

<table>
<thead>
<tr>
<th>Bone(s) involved</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parietal</td>
<td>20</td>
<td>45.45</td>
</tr>
<tr>
<td>Temporal</td>
<td>4</td>
<td>09.09</td>
</tr>
<tr>
<td>Occipital</td>
<td>6</td>
<td>13.63</td>
</tr>
<tr>
<td>Frontal</td>
<td>4</td>
<td>09.09</td>
</tr>
<tr>
<td>Temporal + Occipital</td>
<td>2</td>
<td>4.54</td>
</tr>
<tr>
<td>Frontal + Parietal</td>
<td>2</td>
<td>4.54</td>
</tr>
<tr>
<td>Frontal + Parietal + Temporal</td>
<td>2</td>
<td>4.54</td>
</tr>
<tr>
<td>Parietal + Occipital</td>
<td>2</td>
<td>4.54</td>
</tr>
<tr>
<td>Parietal + Temporal</td>
<td>2</td>
<td>4.54</td>
</tr>
<tr>
<td>Total</td>
<td>44</td>
<td>100</td>
</tr>
</tbody>
</table>

III.10. Types of intracranial hemorrhage

Figure 2 Distribution according to types of intracranial hemorrhage

EDH-Extradural hemorrhage, SDH-Subdural hemorrhage, SAH-Subarachnoid hemorrhage, ICH-Intracerebral hemorrhage

IV. Discussion & Conclusion

This systematic review summarizes the epidemiological characteristics of head injuries in Kolkata, West Bengal. Head trauma as a leading cause of disability and death in young people is a major problem in society and yet it is preventable in the health systems (3). In this study, similar to the results in the other parts of the world, the age group, 20-60 years, constituted more than 70% of the affected (4). This age group is the most active phase of life, physically and socially, and hence outnumber the other road users. Not surprisingly our study shows the overwhelming majority of the deceased (74%) were males. It is due to greater male exposure on urban streets and similar higher incidence of traffic accidents among males has been found by many other researchers (5, 6).

Similarly, the reported mechanisms of injury for FHI [Table 1] in our study compares well to data from other states and countries, with RTAs comprising more than half of the total fatalities. The increased percentage of RTA may be due to faulty roads, lack of awareness among the majority and absence of stringent traffic rules. In this study, 71% of patients after sustaining injuries could be admitted to the hospital, where they later succumbed to their injuries. This figure is similar to studies, conducted in the other parts by fellow researchers (7). Taking period of survival into consideration, similar findings are available in a study conducted in Pune, India (8).
Identical results are found across the country, taking the skull fractures into consideration, where fracture of vault of the skull [Table 2] clearly outnumbers the basilar fractures (9). Rash driving and lack of preventive measures while driving contribute to this high percentage of skull fractures. In the present study, fissure fracture of the skull was the most frequently found fracture [Fig. 1]. Parietal bone was the most commonly fractured bone of the scalp [Table 3]. The base of the skull has maximum fractures at anterior and middle cranial fossae, with the least percentage at posterior cranial fossa. Other researchers also came to similar findings (10, 11).

Most commonly found intra-cranial hemorrhage happens to be subdural hemorrhage [Fig. 2], which is consistent to the findings by other researchers (12).

Discovery of wheel, years ago, ushered in an unending era of revolution in the field of transportation, that still goes on with men’s persistent hunt for better, faster and comfortable automobiles (9). A byproduct of this revolution, is the road traffic accident, of which, fatal head injury is an important consequence. Hospitals should establish ‘Trauma Teams’ to initiate rapid assessment and resuscitation of trauma victims in general, and head injury, in particular. Primary Health Care Centers need to be equipped with life support measures and proper transportation facility for referral of suitable head injury cases to the nearest specialized centers. Finally, the follow up of fatal head injury cases should be extended up to the autopsy fable, by establishing proper coordination with the doctor conducting the autopsy.

Acknowledgements
Special acknowledgement goes to the Department of Forensic Medicine & Toxicology, Nil Ratan Sircar Medical College, Kolkata.

Conflict of interest
No conflict of interest is associated with this work.

Ethical clearance
Taken

Source of funding
None declared

References